

Serial No.: 09/804,051

Docket No.: MIO 0069 PA/40509.125

Amendments to the Drawings

Please replace sheet 3 of 4 containing Figs. 5 and 6 with the Replacement Sheet 3 of 4 enclosed herein.

Remarks

Claims 2, 7, 8, 49, 50, and 57 have been amended. Support for these amendments is found in the specification and drawings. Thus, no new matter has been added. New claim 64 has been added. Support this claim is found in the specification and drawings, particularly Figure 6 and page 15, lines 15-21. Claim 6 has been canceled without prejudice. Claims 2, 7, 8, 25-47, 49-51, 53-57, and 63-64 are pending in the present application.

Amendment to the Drawings

Applicants have amended page 15 of the specification to describe what was shown in Fig. 6 and describe in the original claims, for example original claims 2 and 16. Thus, no new matter has been added. Accordingly, an amended paragraph has been enclosed herein.

Amendment to the Specification

Applicants have amended page 15 of the specification to describe what was shown in Fig. 6 and describe in the original claims, for example original claims 2 and 16. Thus, no new matter has been added. Accordingly, an amended paragraph has been enclosed herein.

Rejection under § 112

Claims 2, 6, 7, 8, 49, 50 and 57 have been rejected under 35 U.S.C. 112, second paragraph, as being in definite. Claim 2 has been canceled without prejudice. Claims 6, 7, 8, 49, 50, and 57 have been amended to delete the language "capacitor accommodated in a space defined by a thickness dimension of a topographic contact". Accordingly, Applicants respectfully submit that claims 6, 7, 8, 49, 50, and 57 are in condition for allowance and thus request a withdrawal of the rejection of these claims under 35 U.S.C. 112.

Rejection under § 103

Claims 2, 6, 7, 25-36, 47, 49-51, 53-58 and 60-63 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Lo et al (US 6,507,098; previously cited reference) in combination with Suzuki et al (US 5,532,910; previously cited reference). Claim 8 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Lo et al in combination with

Distefano (US 6,075,289; newly cited reference), Suzuki et al and Searls (US 2004/0155335; newly cited reference).

Applicants respectfully traverse the rejections of the claims and submit that the burden of establishing a prima facie case of obviousness under §103 has not been met. *MPEP* §2145. In order to establish a prima facie case of obviousness under §103, the Examiner has the burden of showing, by reasoning or evidence, that: 1) there is some suggestion or motivation, either in the references themselves or in the knowledge available in the art, to modify that reference's teachings; 2) there is a reasonable expectation on the part of one of ordinary skill in the art that the modification or combination has a reasonable expectation of success; and 3) the prior art references (or references when combined) teach or suggest all the claim limitations. *MPEP* §2145. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Independent claims 2, 7, 8, 49, 50, 57, and 64 recite a multiple die semiconductor assembly comprising, *inter alia*, a first semiconductor die, a second semiconductor die, an intermediate substrate positioned between the first semiconductor die and the second semiconductor die, and a decoupling capacitor mounted to the substrate, wherein a thickness dimension (a) of said decoupling capacitor is less than either a thickness dimension (c) of the first semiconductor die or a thickness dimension (b) of a topographic contact extending between the intermediate substrate and the first semiconductor die.

Applicants respectfully submit that Lo et al., Suzuki et al., Distefano, or Searls teach, suggest, or motivate, singularly or in combination, a decoupling capacitor mounted to an intermediate substrate within a stacked chip arrangement, wherein a thickness dimension (a) of the capacitor is less than either a thickness dimension (c) of the first semiconductor die or a thickness dimension (b) of a topographic contact extending between the intermediate substrate and the first semiconductor die as recited in Applicants' claims. The Examiner acknowledges that Lo does not disclose at least one decoupling capacitor mounted to an intermediate substrate or wherein a thickness dimension (a) of the decoupling capacitor is less than either a thickness dimension (b) or (c) of the respective topographic contact or first semiconductor die.

In order to alleviate this deficiency in Lo's teachings, the Examiner asserts that Suzuki teaches a decoupling capacitor accommodated in a space, mounted on an intermediate substrate

and coupled to a die. However, Suzuki et al. teach the capacitor is mounted to a lead frame, not an intermediate substrate, so as to be connected in series with the output terminals of a IC chip and sealed in mold resin (22). (Col. 1, lines 48-50). In fact, nowhere does Suzuki et al. teach or suggest, singularly or in combination with Lo et al. or any other reference, a capacitor mounted to an intermediate substrate, wherein its thickness dimension (a) is less than the thickness dimension (b) or (c) of the topographic contact or semiconductor die, respectively. Thus, lacking such a teaching or suggestion, the Examiner asserts "With respect to the placement of the capacitor, such that it is mounted on the intermediate substrate, or that a thickness dimension of one of said first semiconductor¹, it would have been obvious, since the rearrangement[s] of parts have been held unpatentable **absent a showing of criticality** or unexpected results. See e.g. In re Japiske, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950) (claims held unpatentable because shifting the position of the starting switch would not have modified the operation of the device); see also In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975) (the particular placement of a contact in a conductivity measuring device was held to be an obvious matter of design choice)." The Examiner asserts that no showing of motivation to rearrange is necessary because legal precedent can provide the rational supporting obviousness of the modification because in the present application, it has been held that mere rearrangement of parts is prima facie case obviousness absent a showing of criticality. (MPEP 2144 [R-5]).

Applicants respectfully submit that there has been a showing of criticality regarding the placement of components, such as the capacitor, within a stacked chip arrangement. For example, the Applicants' state that increased miniaturization of components and greater packaging density of integrated circuits are ongoing goals of the computer industry. (Application, p. 2, lines 25-26). Moreover, Applicants state "However, greater integrated circuit density is primarily limited by the space or 'real estate' available for mounting dies on a substrate, such as a printed circuit board." (Application, p. 3, lines 7-9). Applicants further state "Despite the advantages of the most recent developments in semiconductor fabrication there is a continuing need for improved schemes for increasing semiconductor die density in printed circuit board assemblies." (Id. at lines 12-15). Also, complicating the design and arrangement of the stacked chip arrangement of the present invention, Applicants state that it is preferred that the capacitor be positioned as close as possible to at least one of the semiconductor dies. (Id. p. 13, lines 1-3). Applicants respectfully submit that contrary to the Examiner's assertions, the

criticality of the limitations "the capacitor is mounted to the intermediate substrate" and "the capacitor has a thickness dimension (a) that is less than a thickness dimension of either a topographic contact or semiconductor die" has been shown because the capacitor's placement and size impacts the density of a stacked chip arrangement. Therefore, such limitations are **more than a mere obvious rearrangement of parts.**

Furthermore, in order to rely on legal precedent, MPEP 2144 requires "If the facts in a prior legal decision are sufficiently similar to those in an application under examination, the examiner may use the rationale used by the court." MPEP 2144. In the instant case, the Examiner has proffered no evidence that the facts of the relied upon prior legal decisions are sufficiently similar to the present case. Applicants submit that in the instant case, depending upon where the capacitor is placed within the stacked chip arrangement, the stack height, density, and space availability will be affected. This is sufficiently different than the placement of a starting switch on a hydraulic press or a contact in a conductivity measuring device wherein no concern of density, size, or space has been expressed.

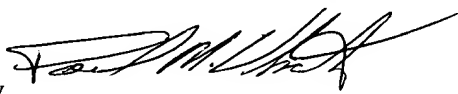
"The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The **prior art must provide a motivation or reason** for the worker in the art, without the benefit of appellant's specification, **to make the necessary changes** in the reference device." (emphasis added) *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984); see also MPEP §2144.04 (VI)(C). Additionally, the Federal Circuit has stated, "The mere fact that prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." *In re Fritsch*, 23 USPQ2d 1780, 1783-4 (Fed. Cir. 1991).

Applicants respectfully submit that the references provide no such required motivation or reason to mount the capacitor of Suzuki et al. on the substrate of Lo et al., let alone that the thickness dimension of the capacitor is less than the thickness dimension of either the topographic contact or semiconductor die as recited by Applicants claims. All the references, i.e., Lo et al., Suzuki et al., Distefano, and Searls are silent, singularly or in combination, as to mounting capacitors in such a stacked chip arrangement, particularly wherein its thickness is less

than the thickness of either the topographic contact or semiconductor die. Moreover, none of the references, singularly or in combination, teach or suggest the capacitor conductively coupled to either the first or second semiconductor dies. These are explicitly claimed limitations that the Examiner has not shown as taught explicitly or implicitly in the art. Lacking the necessary teaching, motivation, or suggestion, Applicants respectfully submit that the Examiner has arbitrarily made the necessary changes in the reference devices to come up with Applicants' claimed invention. Thus, Applicants believe the Examiner has mistakenly used Applicants' specification as a "template" to piecemeal the teachings of the prior art to reject Applicants' independent claims.

Therefore, Applicants respectfully submit that the none of the references, singularly or in combination, teach or suggest all of the limitations of Applicants' claims 2, 7, 8, 49, 50, and 57. Accordingly, the required burden of a prima facie case of obviousness has not been met and the Applicants respectfully request that the rejections under 35 U.S.C. §103 of independent claims 2, 7, 8, 49, 50, and 57 be withdrawn. As claims 25-36, 47, 51, 53-56, and 63 depend from independent claims 2, 7, 8, 49, 50, or 57, the rejection of these claims under 35 U.S.C. §103 should be withdrawn as well. Thus, the Applicants respectfully submit that, in view of the above amendments and remarks, the application is now in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully requested.

Respectfully submitted,
DINSMORE & SHOHL LLP

By 
Paul M. Ulrich
Registration No. 46,404

One Dayton Centre
One South Main Street, Suite 1300
Dayton, Ohio 45402
Telephone: (937) 449-6400
Facsimile: (937) 449-6405
e-mail: paul.ulrich@dinslaw.com

PMU/tlo



3 / 4

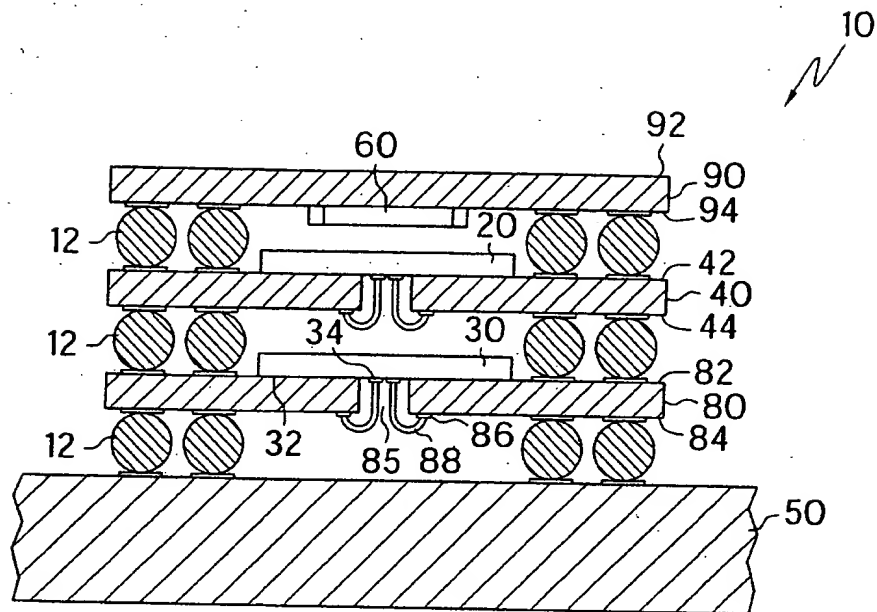


FIG. 5

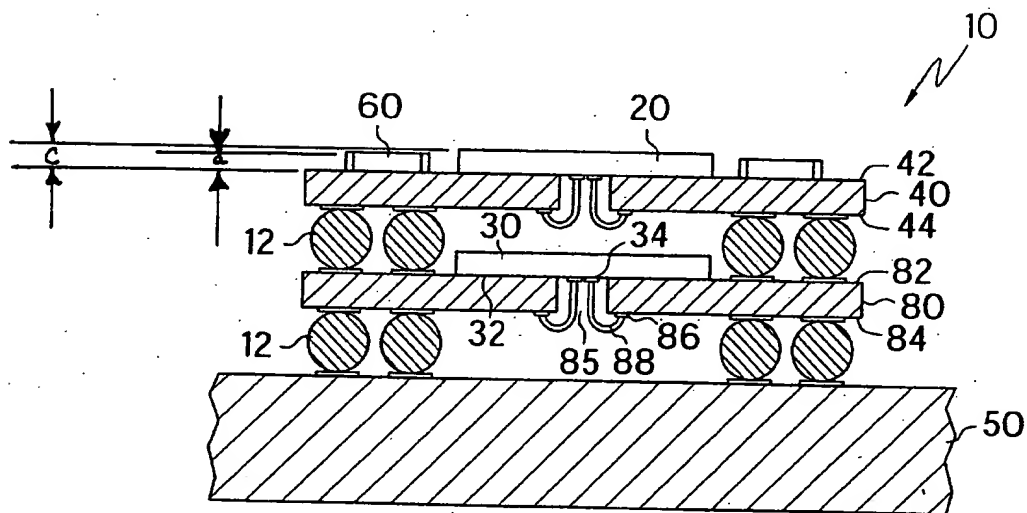


FIG. 6